

Jacob Milea (jmilea@syr.edu)

## **Group Discussion Questions to Think About While Reading**

### **Chapter 4: Nutrient Uptake and Assimilation in Phytoplankton Ecology**

What is the major constraint on the elements implicated in phytoplankton growth?

How much Nitrogen, Phosphorous and Carbon is needed for a phytoplankton to replicate its cell mass?

According to Munk and Riley (1952) and Laxier and Mann (1989) what is the ultimate goal of plankton mobility?

How are nutrients moved into the cell?

What function does a receptor serve in this process?

What function does an operon serve in this process?

Droop (1973 and 1974) adapted the Dugdale model to include a variable internal store, in order to represent the impact of the cell quota on the rate of growth. What are some of the important conclusions able to be drawn from this?

Plankton use what nutrient to perform nucleic acid protein synthesis, form adenosine phosphate transformations and to control intracellular transport?

How do anthropogenic behaviors effect the amount of inorganic Phosphorous present in water?

What anthropogenic activities could effect fluxuations of inorganic Phosphorous levels present in water?

How will the uptake capacity at low (sub-saturated) for algae affect its affinity for Phosphorous and subsequently its ability to compete for often dilute resources?

What are some tell tale signs that the metabolic rate within algae is being limited by Phosphorous?

Define a Mixotroph?

How is Mixotrophy beneficial?

What nutrient can cause severe capacity limitation within large, oligotrophic, deep, lakes at high altitudes that reside in the northern hemisphere?

In what forms is Nitrogen bioavailable?

What does DIN stand for?

What does DON stand for?

What is the chemical reaction that takes place when Nitrogen fixation occurs?

What key ingredients/circumstances must be present for algae to be able to act as a Nitrogen fixer?

Which metals are necessary when growing algae cultures?

Which metals are not necessary for growing algae cultures?

Are the roles of these metals within the cell well defined?

What is Iron used for within algal cells?

What are the major consequences of being Iron deficient?

What aspect of acquiring Iron poses the largest problem for algae?

What functions do organic micronutrients and vitamins perform?

Does the presence of these micronutrients and vitamins effect the evolutionary path of plankton in nature?

What are the main roles of Calcium, Magnesium, Sodium and Potassium within algae?

How does Sulfur uptake and use by phytoplankton affect the air/water interface?

What are the main form of Silicon that is taken up and transported within the cell?

What are the main sinks of Silicon both biologically and environmentally?